

PATENT CLAIMS

1. Line arrangement for electrical systems of vehicles, comprising an electrical supply line (16) running from a current feed terminal (12) to a current delivery terminal (14) and having at least one current-carrying inner conductor (18) and at least one protective sheath (20) surrounding the latter, characterized in that a detector element (32) which runs along the supply line (16) and is formed in such a way that its electrical and/or optical behavior is irreversibly changed when a local arc (28, 28') originating from the current-carrying inner conductor (18) occurs is provided, and in that an isolating circuit (22) which is connected to the current feed terminal (12) and isolates the current-carrying inner conductor (18) from a current source (24) when the electrical and/or optical behavior of the detector element (32) changes is provided.
2. Line arrangement according to one of the preceding claims, characterized in that the detector element (32) is formed in such a way that it irreversibly deteriorates in its electrical and/or optical behavior under the local effect of heat.
3. Line arrangement according to claim 1 or 2, characterized in that the detector element (32) surrounds the supply line (16).
4. Line arrangement according to one of the preceding claims, characterized in that the detector element (32) comprises at least one electrical and/or optical detector line (36), the electrical and/or optical behavior of which is irreversibly changed when the arc (28, 28') occurs.

5. Line arrangement according to claim 4, characterized in that the detector line (36) runs in the form of a helix (40).
6. Line arrangement according to claim 4, characterized in that the detector line (36) runs in the form of meanders (54).
7. Line arrangement according to one of claims 4 to 6, characterized in that portions (52) of the detector line (36) following one another in the longitudinal direction (50) of the supply line (16) and running transversely in relation to a longitudinal direction (50) of the supply line (16) are spaced apart from one another by a spacing (A) which is less than approximately the diameter of the inner conductor (18).
8. Line arrangement according to one of claims 4 to 7, characterized in that the detector line (36) consists of a material which irreversibly changes in its electrical and/or optical behavior when there is local ingress of an amount of heat that can be generated by the arc (28, 28').
9. Line arrangement according to one of claims 4 to 8, characterized in that the detector line (36) consists of a material which irreversibly changes in its electrical and/or optical behavior from a threshold temperature, which lies in the range from approximately 100°C to approximately 500°C.
10. Line arrangement according to one of claims 4 to 9, characterized in that the detector line (36) is surrounded by an insulating protective enclosure (38, 58, 62).

11. Line arrangement according to one of the preceding claims, characterized in that the detector element (32) has a carrier (58), on which the detector line (36) is held.
12. Line arrangement according to claim 10, characterized in that the detector line (36) is disposed in the form of conducting tracks (60) on a carrier (58).
13. Line arrangement according to claim 12, characterized in that the conducting tracks (60) run in the manner of meanders on the carrier (58).
14. Line arrangement according to claim 12 or 13, characterized in that the carrier (58) is given the form of a carrier strip (59).
15. Line arrangement according to claim 14, characterized in that the carrier strip (59) runs helically around the supply line (16).
16. Line arrangement according to one of claims 10 to 15, characterized in that the carrier (58) surrounds the supply line (16) at least partially.
17. Line arrangement according to one of claims 10 to 15, characterized in that the carrier (58) encloses the supply line (16) substantially completely.
18. Line arrangement according to one of claims 11 to 17, characterized in that the carrier (58) forms part of a protective enclosure for the detector line (36).

19. Line arrangement according to one of the preceding claims, characterized in that the carrier (58) consists of a material which irreversibly changes under the effect of the arc originating from the inner conductor (18).
20. Line arrangement according to claim 19, characterized in that the carrier (58) consists of a material which irreversibly deforms under the effect of the arc (28, 28') originating from the inner conductor (18).
21. Line arrangement according to claim 19 or 20, characterized in that the carrier (58) consists of a material which irreversibly decomposes under the effect of the arc (28) originating from the inner conductor (18).
22. Line arrangement according to one of claims 19 to 21, characterized in that, on account of its irreversible change under the local effect of the arc (28, 28'), the carrier (58) irreversibly changes the electrical and/or optical behavior of the detector line (36).
23. Line arrangement according to claim 22, characterized in that the carrier (58) locally interrupts the detector line (36).
24. Line arrangement according to one of the preceding claims, characterized in that the detector element (32) irreversibly changes in its electrical and/or optical behavior when it is mechanically damaged.
25. Line arrangement according to one of the preceding claims, characterized in that the detector element changes in its electrical and/or optical behavior when it undergoes mechanical damage caused by a mechanical component (68) at a potential other than that of the supply line.

26. Line arrangement according to claim 24 or 25, characterized in that the detector line (36) irreversibly changes in its electrical and/or optical behavior when the detector element (32) undergoes mechanical damage.
27. Line arrangement according to claim 26, characterized in that, when it undergoes mechanical damage, the detector line (36) irreversibly deteriorates in its behavior with regard to the passing through of electrical and/or optical signals.
28. Line arrangement according to one of the preceding claims, characterized in that the detector line (36) lies in a circuit specific to the supply line.
29. Line arrangement according to one of the preceding claims, characterized in that at least one detector circuit (48) which activates the isolating circuit (22) is provided.
30. Line arrangement according to claim 29, characterized in that the detector circuit (48) is associated with the current feed terminal (12).
31. Line arrangement according to claim 29, characterized in that the detector circuit (48) is associated with the current delivery terminal (14).
32. Line arrangement according to one of claims 29 to 31, characterized in that the detector circuit (48) communicates with the isolating circuit (22) by means of an electrical line (49).

33. Line arrangement according to one of claims 29 to 31, characterized in that the detector circuit (48) communicates with the isolating circuit (22) by means of a light guide (49).
34. Line arrangement according to one of claims 29 to 33, characterized in that a number of detector circuits (48) are provided and in that the detector circuits (48) communicate with one another to sense a change of the electrical and/or optical behavior of the detector element (32).
35. Line arrangement according to claim 34, characterized in that the detector circuits (48) communicate with one another via an internal line (32, 44) within the line strand.
36. Line arrangement according to claim 34 or 35, characterized in that the detector circuits (48) communicate with one another via an external line (66) outside the line strand.
37. Line arrangement according to one of claims 34 to 36, characterized in that the detector circuits (48) communicate with one another via an electrical line.
38. Line arrangement according to one of claims 34 to 37, characterized in that the detector circuits (48) communicate with one another via an optical line.
39. Line arrangement according to one of claims 29 to 38, characterized in that the detector circuit (48'') detects the occurrence of a potential in the supply line (36) other than that of the detector line.